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MEMORANDUM OF AGREEMENT BY AND BETWEEN THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY AND THE UNITED STATES DEPARTMENT OF ENERGY

This memorandum of agreement confirms the understandings reached by and between the United States Environmental Protection Agency ("EPA") and the United States Department of Energy ("DOE") regarding the operation and environmental management of the Brookhaven National Laboratory ("BNL") in Upton, New York. It is both EPA's and DOE's objective that the BNL be operated so as to maintain full compliance with applicable environmental requirements, and to protect the environment and the health and safety of the workers at the facility and the general public.

While DOE, as a generator of hazardous waste at BNL, is subject to various legal requirements (such as the requirement found at 40 C.F.R. § 262.11 or 6 N.Y.C.R.R. § 372.2(a)(2), directing every generator of solid waste to determine if that waste constitutes a hazardous waste), the commitments described below extend beyond such requirements and include a voluntary initiative on the part of DOE. The goal of these voluntary undertakings is to enhance environmental management at BNL through the development and implementation of an Environmental Management System ("EMS") that is focused on environmental compliance and emphasizes pollution prevention.

DOE will, in good faith and in an expeditious manner, complete the Phase II and Phase III provisions and schedules set forth in the two attachments to this memorandum of agreement. DOE has agreed to complete the Phase II site-wide process and activity evaluation and to conduct Phase III periodic audits of BNL's EMS.

The elements of the Phase II work and Workplan are set forth in Attachment 1, and the elements of the Phase III work are detailed in Attachment 2. Phase II overall activities are scheduled to begin on or before January 1, 1998, and high priority process reviews are scheduled to be completed within one year of the signing of this MOA. Other process reviews are scheduled to be completed by February 28, 2000. DOE will conduct Phase III activities (i.e. annual audits beginning in 1998) in accordance with the schedule specified in Attachment 2.

DOE's completion of the work in accordance with the provisions and schedules of the attachments to this memorandum remains the responsibility of DOE, and DOE agrees that it shall inform its management and operating contractor for BNL of this memorandum and its accompanying attachments, and shall further undertake all that is necessary for said contractor to fully carry out the provisions and schedules of said attachments.

This memorandum and its accompanying attachments may be modified with the written consent of both EPA and DOE. DOE or EPA may abrogate this memorandum or agreement by providing to the other party sixty (60) days written notice of its intent to do so. Further, if either DOE or EPA is unable to meet a deadline specified in either attachment, it shall, as soon as it learns that a delay will occur, notify in writing the other party of the delay, the reasons therefor and when it expects to provide the submission in question (e.g., report, record or comments). If any deadline is missed, such delay shall not automatically extend any later deadlines; for any subsequent late submissions, the notice provision concerning a belated submission discussed in this paragraph is also to be followed.

EPA and DOE acknowledge that this memorandum is not intended to serve as a listing of available rights or remedies, and it is not intended to create any rights or remedies. Nor is this memorandum intended to supersede or otherwise negate any conditions or requirements of any eventual formal agreement or decree, administrative or judicial, EPA and DOE might enter concerning this matter.

EPA and DOE agree that nothing herein is intended or is to be construed to permit either signatory, or the respective entity on whose behalf each is signing, to enforce any of the provisions of this memorandum or the attachments hereto.

Nothing herein is intended or is to be construed to prejudice EPA's right to enforce any applicable law with regard to the operation of the BNL, and nothing herein is intended or is to be construed to prejudice DOE's right to assert any defense under applicable law in any action EPA might bring in a court of competent jurisdiction to enforce any legal requirement with regard to the operation of BNL.

AGREED TO AND ACCEPTED ON BEHALF OF THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY, REGION II

Jeanne M. Fox
Regional Administrator
United States Environmental
Protection Agency, Region II

Dated: March 23, 1998
Upton, New York

AGREED TO AND ACCEPTED ON BEHALF OF THE UNITED STATES DEPARTMENT OF ENERGY

Martha Krebs, Director
Office of Energy Research
United States Department of Energy

Dated: March 23, 1998
Upton, New York

ATTACHMENT 1
PROCESS EVALUATION AGREEMENT

ATTACHMENT 1
PROCESS EVALUATION AGREEMENT

I. Goals:

The goal of the work required by this agreement is to identify all waste streams produced at Brookhaven National Laboratory[1] (BNL), Upton, NY, properly determine the regulatory status of each waste stream, ensure that all waste stream generators are knowledgeable in proper waste management and handling, and ensure that pollution prevention/waste minimization and assessment/prevention/control opportunities are examined, implemented, and tracked, as appropriate.

II. Objectives:

The objective of this agreement is to develop and implement an expedited process evaluation of all experimental and industrial-type operations at BNL for the purpose of identifying all waste streams produced at the facility. The evaluation will also include determining the proper regulatory status of each identified waste stream, to ensure that the wastes are managed in accordance with applicable local, state, and federal environmental regulations and in such a manner as to pose no threat to the environment. The evaluation will establish a baseline of on-going BNL operations and will be used to assess future activities. All experimental and industrial-type operations will be inventoried and assessed. Pollution prevention/waste minimization and assessment/prevention/control opportunities will be identified, tracked, and assessed for implementation.

III. Agreement:

A. DOE agrees to conduct a facility-wide process evaluation, the main elements of which are described in the attached BNL Phase II Process Evaluation Workplan. Time frames for the main elements of the evaluation are also presented in the Workplan.

B. DOE agrees to develop a training program, by March 31, 1998, to provide comprehensive, environmental regulatory and pollution prevention/waste minimization training for all Environmental Safety & Health (ES&H) coordinators, Safety and Environmental Protection (SEP) Division representatives, and others, as deemed necessary.[2] DOE agrees to develop and provide a generic training plan to EPA by March 31, 1998 for review and comment. EPA may submit any comments to be considered by DOE within sixty (60) days of submission of the generic training plan. The training plan will, at a minimum, include:

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1 *The use of "BNL" refers to the management and operating contractor for USDOE at the Brookhaven National Laboratory or the facility itself.*

2 *This includes all successors to Environmental Safety & Health (ES&H) coordinators and Safety and Environmental Protection (SEP) Division representatives, as designated by the BNL management and operation contractor, Brookhaven Science Associates.*

- Prototype training modules for the topics identified in the following paragraph.

- List of trainers (by position title), and their individual qualifications and experience.

- Schedule for completing the identified training.

Subject material for the initial classroom component of this training program will be documented in a training manual and address, at a minimum, the following elements:

- Training objectives

- Comprehensive environmental regulatory requirements overview, including the federal regulations promulgated under RCRA, CWA, CAA, CERCLA, EPCRA, TSCA, and others, as applicable. Applicable state and local regulations and ordinances will also be included.

- Facility-specific operations, waste generation and management, and environmental requirements

- Role of Safety and Environmental Protection Division (or its successor)

- Role of SEP representatives and ES&H coordinators (or their successors)

- Pollution prevention/waste minimization program and assessment/prevention/control program overviews

The quarterly status reports (as described in the Workplan attached to this agreement) will contain a summary of this required training, and will include a listing of when and to whom (by position and title) training classes were given, as a progress report in completing the training.

ATTACHMENT 1A
PHASE II PROCESS EVALUATION WORKPLAN

Attachment 1A
Phase II Process Evaluation Workplan

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Brookhaven National Laboratory **February 27, 1998**
Phase II Process Evaluation Workplan

I. Issue: During the conduct of environmental compliance reviews by both the U.S. Department of Energy and U.S. Environmental Protection Agency, concerns were raised regarding the management of wastes generated by Laboratory activities. Specifically waste stream identification, waste disposal practices, and cognizance of Laboratory personnel regarding waste management practices were identified as programmatic weaknesses.

II. Goals: The goal of this activity is to identify all waste streams, and ensure that: generators are knowledgeable in proper waste management practices, understand the environmental consequences associated with the waste streams produced by their activities, realize opportunities for pollution prevention and waste minimization, and are knowledgeable in the regulatory status of each waste stream.

III. Objective/Scope: Develop and implement a program to review all operations conducted at the Brookhaven National Laboratory[1] (BNL), Upton, N.Y., for the purpose of evaluating and assessing all waste streams produced to validate their regulatory status, to ensure they are managed in accordance with applicable Federal, State and local environmental regulations, and to ensure that Laboratory activities pose no threat to the environment. The initial process evaluation will establish a baseline of current activities. Evaluation of new or on-going activities will be a continuing process and will be an integral part of BNL's Environmental Management System.

IV. Elements:

The Scope of Work for the Process Evaluation shall include the following elements:

A. Systematic Identification/Review of Processes and Activities

1. An inventory will be conducted of all industrial and experimental processes. Inventory of industrial activities will include an initial identification of known operations by the Safety and Environmental Protection (SEP) Division with a request to the Departments/Divisions for identification of other operations considered "industrial-like" (i.e., routine activities producing a steady waste stream). An experimental process inventory will be conducted in order to quantify the experimental review effort and qualify the types of experiments being conducted.

2. A schedule will be prepared for conducting the process evaluation.

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[1] The use of "BNL" refers to the management and operating contractor for USDOE at the Brookhaven National Laboratory or the facility itself.

a. The evaluation will be conducted in two parts. Part I will look at true industrial type activities, and Part II will look at experimental research activities. Performance of the evaluation of industrial activities will involve completion of a Process Assessment Form, and preparation of a Process Flow Diagram. The Process Assessment Form is a detailed evaluation of each activity broken down into distinct operations. Evaluation of experimental research activities will be broken into two tasks. The first task is the completion of the Experimental Design Review, Project Review Documentation (PRD) Form, or equivalent, for all research activities. For experimental processes identified in the PRD as exceeding an established threshold, a Process Assessment Form will be completed including, preparation of a Process Flow Diagram and regulatory determination for each output stream. Copies of typical Project Review Documentation and Process Assessment Forms are attached at the end of this workplan.

b. The Process Evaluation will be conducted in a prioritized fashion. All industrial activities and all experimental activities will be evaluated. Using the following criteria, BNL will prioritize the Phase II inventory of processes and identify a list of high priority projects. Review of the high priority projects will be completed within one-year from the date of execution of the Memoranda of Agreement. All other evaluations will be completed by February 28, 2000. The criteria include:

   1. Quantity of hazardous, mixed and radioactive waste generated;

   2. Utilization of materials that could result in the generation of an acute hazardous waste (as listed in 40 CFR Part 261.33, P-list);

   3. Utilization of materials that are of local concern because they may potentially present a threat to the groundwater or the Peconic River. These include mercury, tritium, strontium-90, 1,1,1-trichloroethane, carbon tetrachloride, trichloroethylene, ethylenedibromide and perchloroethylene, polychlorinated biphenyls, pesticides.

3. The evaluation for both the industrial and experimental activities exceeding thresholds will include the identification of all input and output streams, including chemical feeds, water sources, products, and air releases. All input/output streams will be identified on a Process Flow Diagram which shows all unit operations associated with the activity. For each identified waste stream, a detailed description of waste handling and disposal practices will be provided including: identification and location of waste storage areas, estimated quantity of waste produced per unit

time, means of disposal, identification of existing permits.

B. Waste Stream Identification\Assessment Validation:

Upon completion of each Process Evaluation, a list will be compiled by the process assessor of all waste streams generated by that activity. Each waste stream will be identified by waste type, (i.e., hazardous waste, waste water, air emission) and all waste streams will be initially characterized by the generator using process knowledge and analytical data, if available. The completed evaluations will be submitted to the Safety and Environmental Protection Division for validation and detailed waste stream determination. Review and validation will be performed by regulatory compliance personnel having a minimum of five years experience in the evaluation and application of environmental regulations to industrial or laboratory operations. These individuals will have demonstrated knowledge of RCRA, TSCA, SDWA, CWA, CAA and CERCLA. Validation will include a review of the assessment to ensure adequate and consistent content, technical accuracy and completeness. A walk-down of the activity will be conducted to ensure that the assessment is representative of the operations and is detailed enough to describe all activities. A review of all waste steams will be performed to ensure waste handling practices are adequately described. Once validated the assessment will undergo regulatory determination.

C. Regulatory Determination:

The waste stream identification and initial regulatory determination provided by the generator will be reviewed by regulatory compliance personnel to determine if the waste streams are being properly managed and disposed. Specifically, waste storage, hazard designation, handling, and disposal practices will be reviewed to ensure compliance with Federal (RCRA, TSCA, SDWA, CWA and CAA), State (SPDES, Chemical Bulk Storage) and local (i.e., Suffolk County Sanitary Code) regulations. Regulatory determinations for each waste stream will be documented in the Process Assessment Form. The Process Assessment Form includes a step by step review of each activity broken down into unit operations. Each operation will be broken down into its waste streams and each waste stream will have a regulatory determination made, including applicability of Land Disposal Restrictions (LDR). For experimental activities the Process Assessment Form may be more detailed than the original PRD. A list will be maintained of all waste streams which are potentially not being managed according to applicable environmental regulations and a report detailing these findings will be submitted to the assessment originator for immediate corrective actions. This information will be summarized and reported to the EPA in quarterly status reports.

D. Pollution Prevention and Waste Minimization Opportunities Assessment:

Identification of regulated waste streams is the first step in performing a Pollution Prevention/Waste Minimization Opportunity Assessment. Using the information obtained through Items A, B and C, each waste stream will be evaluated for Waste Minimization/Pollution Prevention opportunities. Opportunities which are found to have environmental, economic and/or technical justification will be further pursued. Planning and tracking of viable Waste Minimization initiatives will be conducted under the BNL Pollution Prevention program. Funding for these initiatives will be actively pursued and implemented projects will be tracked to evaluate waste reductions.

E. Assessment, Prevention and Control:

The operations, experiments, and waste streams where equipment malfunctions and deterioration, operator errors, and discharges or emissions may potentially cause or may lead to releases of hazardous waste or pollutants to the environment, or which potentially pose a threat to human health or the environment, will be identified during the process evaluation. Each of these operations, experiments and waste streams will be assessed to determine:

a. where documented and standard operating practices need to be developed and/or;

b. where routine, objective, self-inspections by department supervision and trained staff need to be conducted and documented.

Each of the identified operations, experiments and waste streams will be tracked to ensure: implementation of corrective actions, follow-up assessments, adequate communication to appropriate site management. The Commitments and Corrective Action Tracking System (CCATS), currently in development, will be the tool for implementing this tracking system. The CCATS is currently being implemented at BNL.

V. Conducting the Process Evaluation

The Process Evaluation will be conducted in two parts.

A. Part I: Industrial Activity Process Evaluation

1. The Part I Process Evaluation will focus on industrial activities conducted at the Laboratory. These activities include all operations which may be categorized as typical "industrial" and include at least the following activities:

   a. Machining and milling operations;

   b. Photographic developing operations including conventional photography, and x-ray;

   c. Metal cleaning facilities;

   d. Plating operations (such as silver, brass);

   e. Electronic assembly;

   f. Ion exchange;

   g. Utilities/Site services (Water, Sewage, Electric and Steam Distribution; Maintenance/Custodial);

   h. Wood working;

   I. Food services;

   j. Vehicle maintenance;

   k. Mechanical assembly;

   l. Glassware cleaning;

   m. Construction/Demolition; and,

   n. Non-CERCLA remediation activities (i.e., spill remediation).

2. To ensure the above list is complete, an inventory of industrial activities will be performed. This inventory will include a directive to all Departments and Divisions to review the above list and to identify any additional activities which may be deemed "industrial-like." All Departments and Divisions will identify a Department representative who will act as coordinator of that Department's/Division's assessments.

3. Using the Process Assessment Form prepared for the Printed Circuit Board Laboratory pilot evaluation and instruction guidance, each industrial process or group of common activities will be evaluated. The evaluation will include:

   a. A brief narrative describing each unit operation associated with the activity.

   b. Development of a Process Flow Diagram showing each unit operation of the activity, flow of materials, and all input and output streams. The Process Flow Diagram will be an accurate representation of the step-by-step activities conducted as part of the overall operation.

   c. For each output stream, an evaluation of the waste characteristics and waste designations will be made. This evaluation will include the assignment of waste identification codes, identification of waste determination supporting documentation (e.g., waste analysis or generator knowledge), description of waste handling practices (i.e., method of storage, location of storage areas), applicability of LDR, and identification of the means of final disposition.

4. Each Process Evaluation will be submitted to the Safety and Environmental Protection (SEP) Division for review and validation. Regulatory compliance personnel within the SEP Division shall review each evaluation for technical accuracy and completeness, proper waste management and disposal, and regulatory determination. Where necessary, the information contained in the Process Assessment Form will be expanded to better define the operations involved in each activity, better describe the wastes produced and provide more detail in waste handling practices. A walk-down of each operation shall also be performed to ensure completeness of the evaluation. All modifications to regulatory compliance and waste management issues will be provided to the originator of the Process Assessment Form to ensure that corrective actions are taken immediately. A list of all corrective actions will be maintained. Each waste stream will also have assigned unique waste stream codes for tracking purposes.

5. Regulatory compliance personnel will evaluate each waste stream for potential waste minimization or pollution prevention opportunities. Those activities identified as

having viable (i.e., environmental, economic or technical justification) merit will be pursued further (i.e., tracked and planned) as potential candidates in the Laboratory sponsored Pollution Prevention program.

6. Operations and waste streams identified during the Process Evaluation which have the potential for equipment malfunction, deterioration, operator error and discharges or emissions which may potentially cause or may lead to releases of hazardous waste or pollutants to the environment or which may potentially pose a threat to human health or the environment will be identified. These operations and waste streams will be assessed to determine:

   a. Where documented and standard operating practices need to be developed and/or;

   b. Where routine, objective, self-inspections by department supervision and trained staff need to be conducted and documented.

   Documentation of corrective actions, communication to accountable site management, and tracking of follow-up assessments associated with these operations and waste streams will be conducted using the CCATS.

Required Actions

a. A Process Inventory questionnaire will be prepared for general lab-wide distribution to ensure all industrial activities have been identified. (Completed)

b. A prioritized listing of industrial operations using the three criteria will be prepared.

c. An instruction manual for performance of the Process Evaluation will be prepared. This manual will provide instruction in the conduct of the review, preparation of the Process Flow Diagram, and glossary of terms.

d. Training in the use of the instruction manual and preparation of Process Flow Diagrams will be developed and provided.

e. The industrial process evaluation will be initiated.

Level of Effort

Based upon the conduct of the pilot evaluations, a total level of effort is estimated at four staff years. Two years should be dedicated to the conduct of the review and two should be dedicated to the validation/review exercise by regulatory compliance personnel and evaluation of pollution prevention opportunities.

B. Part II Experimental Research Evaluation

As part of BNL's Work Planning initiative, a systematic program to review each existing research project will be implemented to ensure all research activities are evaluated for environmental, safety and health impacts. These evaluations will be conducted using the Project Review Documentation (PRD) Form, or equivalent format, used for the experimental pilot evaluations. The Experimental Research Evaluation includes the identification and evaluation of safety issues, environmental releases, waste generation, and provides for the identification of potential pollution prevention and waste minimization initiatives. The results of the Experimental Research Review will be documented on the PRD Form. The evaluation of the activities will be broken down, at a minimum, by funded Field Work Proposal (FWP). The FWP is the description of the research activity through which funding is secured. Each Field Work Proposal will have at least one PRD Form completed. It is anticipated that in excess of 200 existing experiments will be reviewed using the proposed method. Each FWP will be reviewed periodically to ensure that all information contained in the original PRD Form is representative of on-going activities. New FWPs, which receive funding, will complete the PRD prior to start-up of operations. The Experimental Design Review will include the following:

Experimental Design Review

1. Completion of the Project Review Documentation (PRD) Form, or equivalent, by the principal investigator or departmental representative. The PRD Form includes the following information:

    a. General project description;

    b. Identification of chemical processes and materials;

    c. Listing of process equipment;

    d. Identification of chemical/biological/radiological or other materials;

    e. Listing of apparatus and operating conditions (i.e, temperature, pressure, etc.)

    f. A hazards analysis of the experiment;.

    g. A completed safety checklist;

    h. Emergency procedures applicable to the activity;

    i. Identification of environmental issues (e.g. air, water and solid/hazardous waste generation) including:

        1. Identification of all wastes produced (air, water, hazardous, solid);

        2. Description of all waste storage practices (how stored, labeled etc.) and identification of waste storage areas;

        3. Estimated rate of generation (expressed per unit time);

        4. Identification of any existing permits or waste evaluations or determinations for each waste stream;

        5. Description of waste disposal practices (hazardous waste, sink discharge, etc.) including any past assignment of waste codes; and

        6. Description of any previously implemented pollution prevention activities or opportunities that could be implemented if funding were

available.

j. Industrial hygiene concerns.

2. Upon completion of the PRD Form, each principal investigator will certify that the evaluation is representative of the project, evaluate the project with respect to the threshold quantity, and certify that the project either falls below or exceeds the threshold quantity. Threshold quantities are defined as follows:

Projects which meet one or more of the following thresholds will be further evaluated including completion of the Process Assessment Form, preparation of Process Flow Diagrams, and regulatory determinations.

A. The process uses materials that will result in the generation of hazardous, mixed or radioactive waste AND the process generates 1000 cc of hazardous, mixed or radioactive waste or uses materials in excess of the CERCLA or EPCRA Reportable Quantities per set-up (each time the experiment is run).

B. The process requires a point source air permit.

C. The process uses materials which have been identified as exceeding SPDES permit limits or ambient water quality standards (AWQS) in the last five years AND the process utilizes these materials in quantities that, if discharged to the sanitary system would result in a regulatory violation. Those materials are: ammonia, copper, silver, zinc, mercury. Additionally PCBs and pesticides will be included with a zero deminimus.

Quantities deemed significant to cause a SPDES or AWQS violation will be calculated based upon the SPDES, AWQS or DOE standard, an average flow of 700,000 gallons per day, and a safety factor of 50%. This quantity will then be divided among the research community to determine a per set up mass load (assumed to be 50 experiments).**

D. Radioactive material threshold quantities will be determined using a 4 millirem per year ingestion exposure based upon DOE 5400.5 Derived Concentration Guides, an average flow of 700,000 gallons per day, and a safety factor of 50%. The calculated mass quantity will be divided among the research community (assumed to be 50 experiments)**. Calculation would be similar to the above SPDES example.

** Methodology for calculation of thresholds and corresponding quantities will be provided in

the instruction manual (see page 12, Required Actions, Item 4).

3. Completion of the PRD, or equivalent, forms will be in accordance with the prioritization scheme established previously. All completed PRD Forms will be submitted to the SEP Division for review, validation and preparation of the Process Assessment Form, where applicable. Review and validation will be performed by regulatory compliance personnel having a minimum of five years experience in the evaluation and application of environmental regulations to industrial or laboratory operations. These individuals will have demonstrated knowledge of RCRA, SDWA, CWA, CAA and CERCLA. Each PRD Form will be reviewed with respect to technical accuracy and completeness, proper waste management and disposal, and for a regulatory determination. Walk-down of the PRD activity will be performed to ensure that the Process Flow Diagram is representative of all activities and to further validate the PRD information. Once deemed complete and validated, a Process Assessment Form will be completed for each PRD Form meeting the threshold quantities specified above. The Process Assessment Form will be similar to the industrial operation. Due to the number of chemicals which may be utilized in an experiment, an attempt will be made to list inputs and wastes by chemical category (e.g., aromatic hydrocarbons, aliphatic halogenated hydrocarbons etc.) The Process Assessment Form will provide a brief narrative description of the operations associated with the experimental activity and identify each waste stream. Using information contained in the PRD Form, the regulatory status of each waste stream will be documented including applicability of LDR.

4. The SEP Division will review each waste stream and the identified waste handling practices to ensure consistency with environmental requirements. Issues concerning inadequate handling or waste disposal practices will be identified and provided back to the PRD originator.

5. Experiments and waste streams identified during the Experimental Research Evaluation which have the potential for equipment malfunction, deterioration, operator error and discharges or emissions which may potentially cause or may lead to releases of hazardous waste or pollutants to the environment or which potentially pose a threat to human health or the environment will be identified. These operations and waste streams will be assessed to determine:

    a. Where documented and standard operating practices need to be developed; and/or,

    b. Where routine, objective, self-inspections by department supervision and trained staff need to be conducted and documented.

Documentation of corrective actions, communication to accountable site management, and tracking of follow-up assessments associated with these operations and waste streams will be conducted using the CCATS.

Required Actions

1. An inventory of all experimental activities will be prepared to facilitate definition of the ultimate scope of work. The inventory will require that an initial threshold determination be made in order to define the magnitude of the full Phase II experimental effort.

2. The Experimental Research Project Review Documentation Form will be reviewed and revised .

3. Experimental Research PRD Form will be formally adopted.

4. An instruction manual will be developed for completion of the PRD Form and guidance for developing implementation procedures/policies will be established. The instruction manual will provide guidance for the preparation of the form, including a glossary of terms.

5. Training sessions for principal investigators, ESH Coordinators or anyone else involved in the preparation of the PRD Forms will be developed and provided. This training will include a review of the instructions and implementation procedures and will include a question/answer session.

6. Initiate Experimental Research Project Review.

Level of Effort

Based upon the conduct of the pilot evaluations, a total level of effort is estimated at eight staff years. Six staff years should be dedicated to the conduct of the review and two should be dedicated to the validation/review exercise by regulatory compliance personnel and evaluation of pollution prevention opportunities.

VI. Proposed Schedule for Completion

Implementation of the Phase II initiative is included in the BNL Management System Improvement Plan (MSIP) and a tentative schedule has been completed for the Phase II project. The milestones for previously completed tasks and on-going activities as identified by its Work Breakdown Structure (WBS) element are summarized in Table 1 which has been excerpted from the overall MSIP. Modifications to this schedule, if necessary, will be negotiated between EPA and DOE and documented in writing in accordance with the Memorandum of Agreement accompanying this workplan. A list of assumptions used to set the milestones follows the table.

VII. Deliverables

Each Department will prepare and submit to the SEP Division industrial and experimental process evaluations in sufficient detail to ensure that all activities conducted within that Department have been adequately reviewed for environmental impact. The process evaluations in turn will be evaluated by the SEP Division for technical and factual accuracy, completeness and regulatory status. Findings of significant deviations from regulatory requirements identified by this review will be returned to the originating Department with a request for corrective action.

At the start of the Phase II exercise, the first five industrial and experimental process evaluations will be submitted to EPA for review to ensure the format and content of the Process Evaluations are adequate. Copies of all subsequent final evaluations will be maintained in a central location and will be available for review by the EPA, other interested regulatory agencies, and where confidential business information is not present, the public.

Status reports for each quarter of the calendar year will be provided to EPA within thirty (30) days of the end of that quarter to show progress in achieving the end goal. For example a quarterly report will be prepared and submitted to EPA by April 30 for the review period beginning January 1 and ending March 31. The status reports will include the number of evaluations completed to date, roster of completed evaluations, identification of significant waste handling issues, listing of newly identified wastes, progress in achieving final completion milestones, pollution prevention and waste minimization opportunities, Assessment/Prevention/Control tracking and response summary, midcourse modifications or Phase II procedure changes, and a summary of the employee training initiatives, including the number of people trained and dates of training.

A compilation and summation of the information presented in the quarterly reports will be prepared and submitted to the EPA in a final summary report. The final report will also include a listing of all waste streams found to be environmentally regulated and/or of environmental concern. This will include and will differentiate between wastes that were previously identified by BNL and wastes that were newly identified as being regulated or of environmental concern as a result of the Phase II

initiative. Also included in the final summary report are programmatic findings and lessons learned. These will be used in the development of the new Environmental Management System being developed under the Phase III initiative.

Table 1
Phase II Process Evaluation
Tentative Schedule 3/2/98

WBS	Task Description	Time
1.3.10.3.2	EPA Phase II Multi-Media Process Analysis	Completed
1.3.10.3.2.1	Assign Point of Contact	Completed
1.3.10.3.2.2	Appoint Task Group	Completed
1.3.10.3.2.3	Phase II Kick-Off Meeting	Completed
1.3.10.3.2.4	Develop Preliminary Phase II Outline and Schedule for Pilot Assessments	Completed
1.3.10.3.2.5	Prepare Pilot Assessments (2)	Completed
1.3.10.3.2.6	Submit Pilots to EPA	Completed
1.3.10.3.2.7	EPA Review	Completed
1.3.10.3.2.8	Conference Call Review of Pilots	Completed
1.3.10.3.2.9	Pilot Modification/Format Resolution	Completed
1.3.10.3.2.10	Prepare Draft Scope of Work	Completed
1.3.10.3.2.11	Submit Draft Scope of Work to EPA	Completed
1.3.10.3.2.12	EPA Conference Call Review of Draft Scope of Work	Completed
1.3.10.3.2.13	Revise and Finalize Scope of Work	Completed
1.3.10.3.2.14	Prepare Draft Workplan	Completed
1.3.10.3.2.15	Submit Draft Workplan to EPA	Completed
1.3.10.3.2.16	EPA/DOE/BNL Phase II/III Workshop to Finalize Workplan and Agreement	Completed
1.3.10.3.2.17	Develop thresholds for experimental Phase II evaluations	Completed

Table 1
Phase II Process Evaluation
Tentative Schedule 3/2/98

WBS	Task Description	Time
1.3.10.3.2.18	Phase II/III conference call	Completed
1.3.10.3.2.19	Finalize Workplan	Completed
1.3.10.3.2.20	Submit Finalized Workplan	Completed
1.3.10.3.2.21	Conduct inventory of industrial and experimental activities and submit to EPA	Preliminary Completed
1.3.10.3.2.22	Prepare instruction Manual for PRD Review and Process Evaluation	11/30/97 - 2/27/98
1.3.10.3.2.23	Prepare and initiate training for conduct of evaluations	Initiated 1/7/98
1.3.10.3.2.24	Conduct Assessment	1/30/98 -6/30/99
1.3.10.3.2.25	Prepare and submit to EPA a general description of tracking system (CCATS) for Assessment/Prevention/Control initiatives	3/31/98
1.3.10.3.2.26	Prepare quarterly status reports for submittal to EPA	04/30/98, 07/31/98, 10/30/98, 02/01/99. 04/30/99, 07/30/99, 11/01/99
1.3.10.3.2.27	Process Assessments to Task Group (to be completed by) Note: high priority reports will be due by 9/30/98 to ensure completion of high priority report to EPA by 12/31/98.	5/1/98 - 6/30/99
1.3.10.3.2.28	Assessment Validation	5/1/98 - 9/30/99
1.3.10.3.2.29	Prepare Waste Stream Determinations	5/1/98 -11/30/99
1.3.10.3.2.30	Prepare and submit high priority evaluation report to EPA	1 year from MOA signing
1.3.10.3.2.31	Prepare final Summary Report	11/30/99-1/31/00

Table 1
Phase II Process Evaluation
Tentative Schedule 3/2/98

WBS	Task Description	Time
1.3.10.3.2.32	Report Results to the LC, MAG, etc.	1/31/00
1.3.10.3.2.33	Submit Report to EPA	2/28/00

Resource Assumptions

1. Each Process Assessment requires 20 hours of review by SEP.

   Estimated 100 industrial operations requiring evaluation
   Estimated 200 FWP

2. Each FWP or industrial operation requires equal time by PI or Operations Supervisor to complete Project Documentation Form. (Assumed 2 persons @ 20 hours per person).

3. Validation of Process Assessments by Regulatory Compliance personnel is required. Each validation requires 2 hours.

4. Waste stream regulatory determination made for each process assessment requires 6 hours per process.

Glossary of Acronyms

AWQS - Ambient Water Quality Standards
BNL - "BNL" refers to the management and operating contractor for USDOE at Brookhaven National Laboratory or the facility itself
CAA - Clean Air Act
CCATS - Commitment and Corrective Action Tracking System
CERCLA - Comprehensive Environmental Response, Compensation and Liability Act
CFR - Code of Federal Regulations
CWA - Clean Water Act
DOE - Department of Energy
EPCRA - Emergency Planning and Community Right to Know Act
ESH - Environment, Safety and Health
FWP - Field Work Proposal
LC - Leadership Counsel
LDR - Land Disposal Restrictions
MAG - Management Advisory Group
MSIP - Management System Improvement Plan
NPDES - National Pollutant Discharge Elimination System
PI - Principal Investigator
PRD - Project Review Documentation
RCRA - Resource Conservation and Recovery Act
SDWA - Safe Drinking Water Act
SEP - Safety and Environmental Protection Division
SPDES - State Pollutant Discharge Elimination System
TSCA - Toxic Substances Control Act
WBS - Work Breakdown Structure

Attachment 1B
Example Project Review Documentation Form and Process Assessment Form

PRD Number: _____ Proposal Control No. _____ B&R Classification _____

DRAFT

BNL _____ DEPARTMENT
PROJECT REVIEW DOCUMENTATION
COVER PAGE

Group: _____

Building: Lab: Date Prepared:

PROJECT TITLE: _____

PROJECT SUMMARY:

REVIEW SUMMARY:

HAZARD KEYWORDS:

WASTE KEYWORDS:

RELATIONSHIPS TO OTHER PROJECTS:

PRD Number: _____

_____ *Department Member Performing the Experiment:*

Name: Printed	Signature	Date

Group Spokesperson:

Name: Printed	Signature	Date

ES&H Coordinator:

Name: Printed	Signature	Date

Reviewer:

Name: Printed	Signature	Date

SEP Representative:

Name: Printed	Signature	Date

Department Chair:

Name: Printed	Signature	Date

PRD Number: _____

Add sheets wherever more space or additional information is needed.

I. PROJECT DESCRIPTION

A. Project Description and Approach

Anticipating the safety, health, and environmental aspects for each research project will ensure excellent performance in these areas. The PRD records the effort devoted to this thinking and serves as a training vehicle and as a basis for safe work.

Describe the **Project** and the **Approach:**

B. Chemical Processes and Materials

Outline the **Chemical Processes** and **Materials** to be used:

PRD Number: _____

C. Indicate any **Special Equipment** (X-rays, lasers, NMR, mass spectrometers, etc.) that will be used during the project:

II. HAZARDOUS CHEMICALS, BIOHAZARDS, OTHER MATERIAL INVOLVED IN THE PROJECT

A. **For each hazardous waste or substance involved in the project**, the highest level of safety information as listed below, should be readily available.

B. For chemicals that require special precautions to be taken, for example, especially hazardous chemicals or chemicals of extreme toxicity, MSDSs or other safety information are appended.

CAS Registry No.	Name of Material	Formula	MSDS	Other

1. Material Safety Data Sheets (MSDSs) for commercial products can be obtained from the vendor or found at URL http://sun10.sep.bnl.gov/seproot.html and at http://www.chem.utah.edu/MSDS/msds.html. Additional information can be found in the following references.

2. Literature Review or toxicological reference on substances with no available MSDS. References, along with many others available in the Chemistry Department Reading Room include:

Prudent Practices in the Laboratory, Board on Chemical Sciences & Technology, NAS, T55.3.H3P78, 1995.

Bretherick=s Handbook of Reactive Chemical Hazards 4th ed., L. Bretherick, T55.3.H3B73, 1990.

Dangerous Properties of Industrial Materials 6th ed., N.I. Sax, T55.2.S28, 1984.

3. No information is available, for some substances. However, valid inferences can sometimes be drawn from similar substances with known properties . (*The Sigma-Aldrich Library of Chemical Safety Data,* Ed. II, Vols. I & II, T55.3H3S577, 1988, available in the Reading Room).

Information to be included if no MSDS is available:

A. Product name and/or generic name.

B. Emergency telephone number of vendor.

C. **Physical data** of the material, such as boiling point, vapor pressure, density, etc.

D. **Health hazards**, including effects of short- and long-term exposure to eyes and skin, or if breathed or swallowed. Relevance of **permissible exposure limits** such as **TLV**.

E. **Reactivity data**, such as materials that are incompatible with the substance, and any **hazardous decomposition products**.

F. **Spill or leak procedures**, including immediate action necessary to control a spill or leak, protective equipment required, the clean-up procedure to be used, and the proper **disposal method** for the waste materials.

G. **Storage and handling precautions**, including personal protective equipment necessary when handling the material, and the requirements for safe storage.

H. Special precautions and comments not contained in any of the other **MSDS sections**.

4. All containers must be labeled with either the chemical name or generic name.

5. Requirements of employees to **report** any adverse reaction to immediate supervisor. Requirement of supervisor to see that the employee or guest report to the Occupational Medicine Clinic upon experiencing any adverse reactions.

PRD Number: _____

I. SAFETY

Describe, as well as can be anticipated, the **Apparatus** that will be used and the **operating conditions** that will be involved.

A. Apparatus and Operating Conditions

B. Hazard Analysis

Indicate how your experimental plan is designed to control physical hazards. *Complete the Safety Check List and comment on any items that pose special risks and therefore need special attention, e.g.*, high temperature, high pressure, chemical instability. For each project, describe one or two the greatest risks and indicate the steps that will be taken to minimize them.

PRD Number: _____

C. SAFETY CHECK LIST

This list, although not exhaustive, highlights examples of items to be considered during the preparation of a PRD.

_____Ensure that all laboratory workers have completed their basic Department-specific training before start of work in the laboratory. Ensure the completion of required job hazards safety training courses (as determined by supervisor).

Fire Extinguishers:

_____Ensure that the correct type is available and that they are properly placed.
_____Ensure that all employees are knowledgeable in their correct use.

Hoods:

_____Carry out all chemistry, if possible, in a laboratory chemical fume hood.
_____Conduct all work at least 6 inches into the hood.
_____Position equipment so as not to block the exhaust slots in rear of hood; leave sash in place and in as maximally closed position as practical.
_____Do not store more than absolutely necessary in hoods.

Site-specific:

_____General eye protection (glasses, shields, explosion shields).
_____Work with machinery and chemicals requiring special eye protection.
_____Work requiring special foot protection.
_____Work requiring lifting more than 50lbs.
_____Use and transfer of cryogenic fluids.
_____Use, handling, waste disposal of hazardous chemicals.
_____Use of carcinogens.
_____Handling and storage of acids/bases.
_____Reactive metals (alkali metals series).
_____Location and use of safety eyewash and showers.
_____Pressurized gases.
_____Radioactive materials
_____Waste minimization, RCRA.
_____Disposal of radioactive or mixed waste
_____Use of X-ray equipment.
_____High voltage/current.
_____Equipment requiring ground fault interrupt devices.
_____Laser areas.
_____Magnetic fields.
_____Work with or generate RF or microwave; UV; intense light sources.

PRD Number: _____

D. EMERGENCY PROCEDURES

IV. ENVIRONMENT

Review the project from the perspective of the environment, including air emissions, waste water discharge, hazardous and solid waste, PCBs, asbestos, etc. Include both radioactive and nonradioactive waste streams.

Waste Disposal. Identify and show the quantities and disposal methods of the products and waste materials involved in the project. Those that are of particular concern should be discussed at length: type of waste, quantity, *etc.* Indicate **Waste Minimization and Risk Reduction** measures that will be taken in the project as required by the *Resource Conservation and Recovery Act* (RCRA). Survey the project from the standpoint of whether:
experimental work can be carried out on a smaller scale, concentration can be increased to decrease waste per experiment, any material can be recovered or recycled, liquids can be processed into more readily disposable solid waste, smaller amounts of materials can be ordered to minimize leftovers, substitution may lessen the hazard level of waste.

A. ***Waste Disposal, Waste Minimization and Risk Reduction.*** *Estimate amounts produced annually and describe fate(s) of these materials.*

B. ***Anticipated Environmental Problems and Resolution***

Discuss **Anticipated Environmental Problems and their Resolution.**

PRD Number: _____

V. **INDUSTRIAL HYGIENE**

A. ***Inhalation*** (type of hood and face velocity or breathing apparatus required)

B. ***Contact with chemicals*** (safety glasses, face shields, gloves, protective clothing)

C. Radiation (shielding, time limitation, ALARA. Also consider RF or microwave, UV, lasers, intense light sources.)

D. ***Monitoring*** (of laboratory work area)

PRD Number: _____

VI. PROJECT TRAINING

1. Hazard Communication/Lab Standard training shall be mandatory for **all workers** who will be working with some or all of the **project chemicals** listed in Section II of the PRD.

2. **Properties of the materials.** The supervisor shall review the health effects of short and long-term exposure, methods employed to reduce exposure, precautionary indicators of exposure (smell, vapor, mist, or lack of indicator), safety devices to use, and emergency procedures.

3. **Procedures**. In addition, the supervisor shall discuss the safety, health , and environmental implications of the operations and reactions to be encountered in the course of the research, as outlined in the PRD.

VII. PROJECT CLOSEOUT

Describe procedures for closing out this project (waste disposal, decontamination, Y)

VIII. CONSIDERATIONS FROM ES&H STANDARD 1.3.5 NOT EXPLICITLY COVERED ELSEWHERE

PRD Number: _____

IX. CERTIFICATION OF EMPLOYEES AND GUESTS WORKING ON THIS PROJECT

Obtain the certification signature of all employees and guests working on the project. As new workers arrive, they will be provided a copy of the PRD to read and their signatures will be recorded on the original PRD. Original PRDs will be maintained in the _____ Department office.

Through **hazard communication/lab standard training**, these personnel shall be made aware of the hazards and proper handling of the chemicals with which they will be working, and of their rights under the **OSHA Hazard Awareness Rule**.

The employees and guests listed below certify by signature and date that they have read and understand the foregoing Project Review Documentation and the pertinent MSDSs and other hazards data and that they have discussed these issues with their supervisors (*cf.* part VI).

Name		***Life/Guest #***	***Date***
Printed	signature		

BROOKHAVEN NATIONAL LABORATORY
PROCESS ASSESSMENT FORM

I. General Information

Process ID:				
Process Name:				
Process Flow Diagrams:				
Process Description:				
Dept/Div:				
Dept Code:				
Building:				
Room(s):				
Point of Contact:		Extension		
Prepared by:		Reviewed by:		

II. Detailed Process Descriptions and Waste Determinations

For each step associated with an experiment, provide a brief description. Include the size of the apparatus, temperature and equipmennt used to accomplish the step. Describe each waste stream (air, water, solid) produced and complete the following table.

Waste Id.	Waste Description	Determination/Basis	Waste Handling

III. Pollution Prevention Opportunities

Each waste stream will be evaluated for the application of pollution prevention or waste minimization initiatives. Specifically consideration should be given to substitution of raw materials with those which are non-hazardous or less toxic, reducing the quantity of raw materials, reuse of waste products as alternate raw materials, or any other initiative which would lead to either a reduction in volume, or reduction in the toxicity of the wastes produced.

Opportunities which are found to have environmental, economic and/or technical justification should be fully described.

IV. Assessment, Prevention and Control

The operations, experiments, and waste streams identified during the Process Evaluation which have the potential for equipment malfunction, deterioration, operator error and discharges or emissions which may potentially cause or may lead to releases of hazardous waste or pollutants to the environment or which potentially pose a threat to human health or the environment should be identifed and fully described. These operations and waste streams will be assessed to determine:

a. Where documented and standard operating practices need to be developed; and/or,

b. Where routine, objective, self-inspections by department supervision and trained staff need to be conducted and documented.

Documentation of corrective actions, communication to accountable site management, and tracking of follow-up assessments associated with these operations and waste streams will be conducted using the CCATS. Tracking identification should be provided along with the issue description.

ATTACHMENT 2
ENVIRONMENTAL MANAGEMENT SYSTEMS AUDIT AGREEMENT

Attachment 2
Environmental Management Systems Audit Agreement

Table of Contents

Attachment 2
Environmental Management Systems Audit Agreement

I. Goals

The goal of this agreement is to develop a five-year audit program whereby the Department of Energy (DOE) can gauge the progress of the Brookhaven National Laboratory (BNL)[1] in implementing an effective Environmental Management System (EMS) which is designed to assure full compliance with regulatory requirements and to provide for continuous improvement in environmental stewardship. The audit process described below is structured to include three phases with specific progressive objectives for each phase. DOE's goals for the first two audits (Phase 1) are to provide BNL with constructive feedback on EMS implementation progress, and to comment on the soundness and completeness of BNL's planned improvements for future years. The goal of the third audit (Phase 2) is to (a) independently assess the entire EMS to determine whether its implementation by BNL meets the criteria defined in Attachment 2A of this Agreement, and (b) to identify any issues that may require further improvements or evaluations. It is the goal of BNL and DOE to have a fully implemented EMS in place prior to the third year audit. The goals of the last two audits of this program (Phase 3) are to verify that the EMS is being maintained, and that continuous improvement has been institutionalized.

II. Objectives

This agreement is for five (5) annual audits of BNL's progress in implementing an EMS, and conforming with the criteria identified in Attachment 2A. The first two audits will be conducted by the DOE and/or its consultants. The third audit will be conducted by an independent third party contracted by the DOE. Audits during the fourth and fifth years again will be conducted by the DOE and/or its consultants.

A. Audit Years 1 and 2 (1998 and 1999). The following are the objectives of the first two audits to be conducted by the DOE and/or its consultants:

1. To verify progress on those elements addressed by BNL's EMS Plan contained in the Management Systems Improvement Program (MSIP) Plan for that audit year;
2. To evaluate, where systems have been implemented, conformance to the criteria specified in Attachment 2A; and
3. To review and comment on the EMS Plan for the following years. This will be done by confirming that the Plan addresses previously identified management system improvement needs and by validating, through field

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[1] The use of "BNL" refers to the management and operating contractor for USDOE at the Brookhaven National Laboratory or the facility itself.

sampling, that the critical systems needs have been identified and included in the EMS Plan.

B. Audit Year 3 (2000). The objective of the third year audit is to have a comprehensive third party review and assessment of BNL's EMS primarily to determine the following:

1. Whether the EMS conforms to the criteria specified in Attachment 2A;
2. Whether the EMS has been properly implemented; and
3. If there are areas that require further improvement or evaluation.

C. Audit Years 4 and 5 (2001-2002). The final two audits will be conducted by the DOE and/or its consultants to determine the following:

1. Whether the EMS conforms to the criteria specified in Attachment 2A;
2. Whether the EMS has been properly implemented;
3. If there are areas that require further improvements or evaluation; and
4. To assess whether the EMS is being properly maintained and whether a posture of continuous improvement has been achieved.

III. Agreement

Beginning in 1998, the DOE agrees to conduct and/or contract for third-party auditors to conduct the annual EMS audit at BNL in accordance with the provisions identified below for five (5) consecutive years. General provisions are identified in Section IV. For the third year, the additional provisions identified in Section V also apply. The DOE agrees to allow the Environmental Protection Agency (EPA) representatives, and representatives of the state and of local governments, to observe all EMS audits specified in this agreement, and have access to all related documentation. DOE agrees to brief interested outside parties prior to, and upon completion of, each audit. DOE agrees to provide copies of this agreement to these agencies and to all third-party auditors before they are retained to conduct any of the audits required by this Attachment 2. This Attachment is incorporated by reference into the cover Memorandum of Agreement between EPA Region II and DOE.

IV. General Provisions for all EMS Audits

A. DOE agrees to plan and conduct, or have conducted, each EMS audit, except for the audit to be conducted in the third year. The third audit will be conducted by an independent third party in accord with these general provisions, as well as those described in Section V. All audits will be conducted in accordance with these general provisions, using ISO 14010 and 14011 and ASTM Provisional Standard 12-95 as supplemental guidance. Each audit's objectives will be as stated in Section II above. Each audit will encompass an evaluation of the

adequacy of implementation, from top management down, throughout each BNL Directorate, or its successor, to identify where further improvements should be made to the EMS. With respect to determining conformance with the criteria of Attachment 2A, the auditors will assess the following:

1. Whether there is a defined program or planned task for the EMS element;
2. Whether the program or task has been implemented, is being maintained, and to what extent;
3. Whether the program or task, including employee training, is effectively achieving its intended performance;
4. Whether BNL is effectively communicating environmental requirements to affected parts of the organization, including visiting scientists/ researchers; and,
5. Whether there are observed deviations from BNL's written requirements or procedures.

B. DOE will ensure that the auditors performing the EMS audits, required by this agreement, satisfy the requirements of ISO 14012. DOE will identify any and all site-specific training requirements for the auditors so they can effectively and safely conduct the required audits and will ensure that their training is completed prior to conducting the audit.

C. DOE agrees to prepare and provide to EPA for review and comment an Audit Plan for each EMS audit at BNL; the Plan will be provided by March 31 of each year. The Plan will include a schedule for completing the audit reports and will include the items listed below. EPA agrees to send any comments to be considered by DOE within sixty (60) days of the submission of the Audit Plan. DOE agrees that the following items will be identified in each Audit Plan:

1. Audit criteria, scope, and objectives;
2. Areas, functions and locations to be audited which are priorities, and why;
3. Audit procedures, including root cause determinations for identified non-conformances;
4. Auditors and demonstrate that their qualifications satisfy the requirements of ISO 14012. The plan will specifically address how objectivity and independence will be ensured for auditors who are DOE employees;
5. The schedule for conducting and completing the audit;
6. The date the audit report will be completed; and,
7. Successive audit plans, after the first audit, also will include a review and evaluation of the implementation of the Action Plan (see Section IV E) for the previous audit.

D. DOE agrees to prepare, or have prepared, an Audit Report for each audit. DOE

agrees that each Audit Report will be completed and provided to the EPA before the end of the calendar year in which the audit was conducted. EPA agrees to provide any comments to be considered by DOE within sixty (60) days of submission of the Audit Report. As a minimum, each Audit Report will:

1. Identify the audit teams' members;
2. State when the on-site audit was conducted;
3. Present the results of the evaluation, as required under Section IV A, above, and delineated in each respective Audit Plan;
4. Present the results of root-cause analyses for observed nonconformances and deficiencies; and,
5. Make recommendations for EMS improvements, including training.

E. DOE agrees to prepare or have prepared an Action Plan which will respond to each respective Audit Report's recommendations for EMS improvements. In each Action Plan, DOE agrees to do the following:

1. Address each finding (i.e., observed nonconformance or deficiency) in the respective Audit Report, and state how it will be addressed;
2. Identify plans to address broader issues arising from individual findings (i.e., address root-causes identified for specific non-conformances or address facility-wide issues); and,
3. Identify for each recommendation in the Audit Report those it intends to implement and/or plans to implement with modification(s). DOE agrees to explain in its Action Plan the rationale for not implementing recommended changes to the EMS.

DOE agrees to provide the Action Plan to EPA within sixty (60) days after preparing or receiving the Audit Report. EPA agrees to provide any comments to be considered by DOE within sixty (60) days of submission of the Action Plan.

V. Additional Provisions for the Third Year Independent Third-Party EMS Audit

A. DOE will arrange for, and fund, an independent, third-party EMS audit in the third year of this five-year audit agreement, in lieu of the DOE EMS audit, as described by the general provisions of this Agreement and defined by Section IV A, above. The scope of the audit will be determined by the third-party auditor(s) based, in part, on the results of the previous audits and in consultation with DOE and EPA. DOE agrees that the third-party auditors will meet the qualifications criteria and training requirements specified in Section IV B of this agreement. The auditors will prepare the Audit Plan to address the general provisions listed in Section IV A, above. DOE agrees to provide copies of this agreement to all third-party auditors before they are retained to conduct the audits. EPA agrees to

provide any comments to be considered by DOE within sixty (60) days of submission of the Audit Plan. The Plan will be prepared and provided in accordance with Section IV C, above.

B. The independent third-party auditors will prepare a comprehensive Audit Report based on their audit and will provide the report concurrently to EPA and DOE in accord with the Audit Plan schedule. EPA agrees to provide any comments to be considered by DOE within sixty days (60) of submission of the Audit Report. DOE agrees that the Audit Report will contain the following:

1. Results of the program and evaluations of activity evaluations as described in Section IV D, Items 1 through 5; and,
2. Areas of concern that merit further review or evaluation for potential environmental or regulatory impacts in the judgement of the independent third-party auditors.

C. DOE agrees to prepare, or have prepared, an Action Plan which will respond to the Audit Report. In the Action Plan, DOE agrees to do the following:

1. Address each finding (i.e., observed nonconformance or deficiency) in the audit report and state how it will be addressed;
2. Identify plans to address broader issues arising from individual findings (i.e., address root causes identified for specific non-conformances or address facility-wide issues); and,
3. Identify for each recommendation in the Audit Report those it intends to implement and/or plans to implement with modification(s). DOE agrees to include in its Action Plan an explanation of its rationale for not implementing recommended changes to the EMS.

DOE agrees to provide the Action Plan to EPA within sixty (60) days after receiving the Audit Report. EPA agrees to provide any comments to be considered by DOE within sixty (60) days of submission of the Action Plan.

Attachment 2
Environmental Management Systems Audit Agreement

List of Acronyms

American Society for Testing Materials ..... ASTM

Brookhaven National Laboratory ..... BNL

Department of Energy ..... DOE

Environmental Management Systems ..... EMS

Environmental Protection Agency ..... EPA

International Organization for Standardization ..... ISO

Management Systems Improvement Program ..... MSIP

ATTACHMENT 2A
ELEMENTS OF BROOKHAVEN NATIONAL LABORATORY'S ENVIRONMENTAL MANAGEMENT SYSTEM

Attachment 2A
Elements of Brookhaven National Laboratory's Environmental Management System

Table of Contents

Attachment 2A
Elements of Brookhaven National Laboratory's Environmental Management System

I. Introduction

Brookhaven National Laboratory's (BNL's)[1] approach for managing environmental matters is embedded within a site-wide integrated system for Environment, Safety and Health (ES&H). BNL's Integrated Environment, Safety and Health Management System (IESHMS) will be a single, defined management system that integrates ES&H requirements into work planning and operational processes to effectively protect workers, the public, and the environment, and to comply with regulatory requirements. The elements of BNL's IESHMS are derived from the following sources:

A. The philosophies, principles and requirements of the *DOE's Integrated Safety Management System Policy* (DOE P 450.4);

B. The International Organization for Standardization (ISO) specifications and guidance for Environmental Management Systems (EMS) (ISO 14001 Standard); and

C. There will be enhanced emphasis on compliance assurance, pollution prevention and community outreach.

The DOE's Integrated Safety Management System (ISMS) Policy (P 450.4) and ISO 14001 are incorporated by reference to this attachment; the key elements of these are given in Sections II and III, respectively. Section IV discusses the elements for enhanced focus on compliance assurance, pollution prevention and community outreach. Together these elements will form the basis of BNL's EMS, and compose the criteria for auditing the BNL EMS for the purpose of this agreement.

II. The Department of Energy Integrated Safety Management System

The Integrated Safety Management System Policy, which is consistent with, and complements, ISO 14001, is based on seven Guiding Principles and five Core Functions, described below:

A. The Seven Guiding Principles form the conceptual framework that characterizes the principles, programs, and disciplines that are essential elements of a sound

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1 The use of "BNL" refers to the management and operating contractor for USDOE at the Brookhaven National Laboratory or the facility itself.

ES&H management system. These principles, as they relate to BNL, are:

1. **Line Management Responsibility for ES&H**. BNL's Line Management is directly responsible for protecting workers, the public, and the environment.
2. **Clear Roles and Responsibilities**. Clear and unambiguous lines of authority and responsibility for ensuring environmental, safety, and health protection will be established and maintained by BNL at all organizational levels, including its contractors.
3. **Competence Commensurate with Responsibilities**. BNL personnel will possess the experience, knowledge, skills, and abilities that are necessary to discharge their responsibilities.
4. **Balanced Priorities**. BNL will effectively allocate resources for environmental, safety, and health programs, and operations. Protecting workers, the public, and the environment will be a priority at BNL whenever activities are planned and carried out.
5. **Identification of ES&H Standards and Requirements**. Before work is started, BNL will evaluate the associated environmental, safety, and health hazards; an agreed-upon set of requirements and standards for environment, safety and health will be established which, if properly implemented, will adequately assure that workers, the public, and the environment are protected from adverse consequences.
6. **Hazard Controls Tailored to Work Being Performed**. BNL will tailor administrative and engineering controls to prevent and mitigate environmental, safety, and health hazards from work being performed.
7. **Operations Authorization**. BNL will establish and agree upon the environmental, safety, and health conditions and requirements to be satisfied for operations to be initiated and conducted at BNL.

B. The five ES&H management Core Functions defined in DOE P 450.4, supported by the Guiding Principles, provide the necessary framework for work at BNL that could potentially affect workers, the public, or the environment. These Core Functions are:

1. Define Scope of Work
2. Analyze the Environmental, Safety, and Health Hazards
3. Develop and Implement Controls for Environmental, Safety, and Health Hazards
4. Perform Work within Controls
5. Provide Feedback and Make Continuous Improvements

III. The International Organization for Standardization, Environmental Management Systems

An EMS is defined in ISO 14001 as "...the part of the overall management system that includes organizational structure, planning activities, responsibilities, practices, procedures, processes, and resources for developing, implementing, achieving, reviewing and maintaining the environmental policy." BNL's EMS will be based upon specifications and guidance for the following five ISO 14001 EMS elements:

A. BNL's top management will define the BNL's environmental policy [4.2][2]

B. BNL will formulate a plan to fulfill the environmental policy, which will include the following [4.3]:

1. Environmental aspects and impacts [4.3.1]
2. Legal and other requirements [4.3.2]
3. Objectives and targets [4.3.3]
4. Environmental management program [4.3.4]

C. BNL will implement the plan and operate in a manner that achieves the plan's objectives and targets [4.4]:

1. Structure and responsibility [4.4.1]
2. Training, awareness and competence [4.4.2]
3. Communication [4.4.3]
4. Documentation of Environmental management system [4.4.4]
5. Document control [4.4.5]
6. Operational control [4.4.6]
7. Emergency preparedness and response [4.4.7]

D. BNL will have the following systems for checking the performance of its environmental programs, assuring compliance with regulatory requirements and assuring timely corrective actions and reporting [4.5]:

1. Monitoring and measurement [4.5.1]
2. Nonconformance and corrective and preventive action [4.5.2]

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[2] Numbers in brackets [] refer to criteria in ISO 14001.

3. Records [4.5.3]
4. Environmental management system audit [4.5.4]

E. At predetermined intervals, BNL's top management will review the EMS to ensure its continuing suitability, adequacy and effectiveness [4.6].

IV. Enhanced Emphasis on Compliance Assurance, Pollution Prevention and Community Outreach

BNL will enhance the overall management of ES&H with explicit focus on compliance assurance, pollution prevention, and community outreach.

A. Compliance Assurance: BNL's emphasis on compliance assurance will specifically encompass the four following elements:

1. Planning. BNL will establish appropriate programs and procedures to accomplish the following:
   a. Identify, interpret, track and effectively communicate environmental requirements to BNL employees, visiting researchers, experimenters, contractors, and service providers. The scope includes prospectively identifying and obtaining information about changes and proposed changes in environmental requirements, and incorporating those changes into the EMS; and,
   b. Anticipate, identify, implement, track, and complete activities necessary to meet legal and other requirements associated with the environmental impacts of its operations.

2. Implementing and Operation Control. BNL will:
   a. Integrate regulatory requirements into facility operations, including those of on-site contractors; and,
   b. Ensure that environmental reports required by federal and state regulations and policy are routinely prepared and submitted, as appropriate, on a timely basis.

3. Checking and Making Corrective Actions. BNL will implement self-assessment and corrective action programs which ensure the following:

   a. Assess operations;

   b. Report incidents and non-compliance; investigate them and follow-up;

   c. Implement and coordinate compliance audits;

   d. Identify and address root causes;

   e. Provide prompt and complete follow-ups; and

   f. Assign organizational personnel responsibilities.

4. BNL will maintain a positive and proactive relationship with regulatory agencies.

B. Pollution Prevention Program. BNL will develop an internal program for preventing, reducing, recycling, reusing, and minimizing waste and emissions, including procedures to substitute materials. The program will include mechanisms for identifying candidate materials to be considered by this program. As part of this program, BNL will develop objectives and targets for pollution prevention and track progress.

C. Community Outreach. BNL's environmental policy statement will reflect BNL's commitment to provide outreach to the community. The environmental policy statement will be widely distributed and easily accessible throughout the facility and the surrounding community. BNL will have procedures and will demonstrate how it solicits, receives, documents, and responds to external communications regarding its environmental aspects and its environmental management system.

Attachment 2A
Elements of Brookhaven National Laboratory's Environmental Management System

List of Acronyms

Brookhaven National Laboratory ..... BNL

Environment, Safety and Health ..... ES&H

Environmental Management Systems ..... EMS

Integrated Environment, Safety and Health Management System ..... IESHMS

Integrated Safety Management System ..... ISMS

International Organization for Standardization ..... ISO